

E.W.V.3.
✓

LIBRARY
STATE PLANT BOARD

UNITED STATES
DEPARTMENT OF AGRICULTURE



BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME III

No. 1.



Digitized by the Internet Archive
in 2016

<https://archive.org/details/newsletter3119wash>

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

N E W S L E T T E R

FOR NOVEMBER 1935

Vol. III, No. 1

(Not for publication)

January 1, 1936

The News Letter is sent to you as confidential information and is sent only to employees of the Bureau. It has recently come to our notice that information from the News Letter has fallen into the hands of those for whom it was not intended. Will you please take care that it is not made available to anyone outside of the Bureau.

A. C. BAKER PLACED IN CHARGE OF FRUIT FLY INVESTIGATIONS

To provide better coordination and direction of important investigations on fruit flies, a special operating unit was established, effective December 10, with A. C. Baker in charge. The headquarters of this Division will be at Mexico City. Heretofore investigational work on fruit flies has been carried on in four laboratories, which have reported to two different units in the Bureau. It is believed that bringing the work together as one unit under one leader directly responsible to the Chief of Bureau will make it possible to accomplish the desired results more promptly. The change is made for organization reasons and to better coordinate these activities, without criticism of results obtained at individual laboratories or of administrative direction of the units responsible for them.

FRUIT INSECT INVESTIGATIONS

Lead and calcium arsenate apparently repel common red spider on apple trees.--E. J. Newcomer, Yakima, Wash., reports that a severe infestation of Tetranychus telarius L. occurred in the orchard block used for codling moth experiments. The block was divided into 32 small plats. Eight spray treatments were used in this block and each was replicated four times. Four of these treatments consisted of lead arsenate, with soap or calcium arsenate, and dry milk. In the other four, nonarsenicals, including cuprous cyanide with dry milk, phenothiazine, nicotine-bentonite, and nicotine extract with oil emulsion, were used. About the middle of August a detailed survey of the block showed that 2 percent of the trees receiving arsenical treatments were heavily infested with the red spider, as against 76 percent for the trees receiving the other treatment. Because of the striking difference in infestation and the fact that trees in both categories were distributed indiscriminately throughout the experimental block, this difference cannot be ascribed to chance. One tree had been left entirely unsprayed because it had no fruit and all of the surrounding trees were sprayed with an arsenical. The unsprayed tree was heavily infested, but the others had only a light infestation. Trees

sprayed with nicotine-bentonite had the lightest infestation of those on which a nonarsenical was used, only 47 percent of these trees being heavily infested, as compared with 84 percent in the other three nonarsenical treatments. This material deposited the heaviest solid residue of any of the nonarsenicals. In this region it is a common occurrence, however, to have serious infestations of these red spiders in orchards that are heavily sprayed with lead arsenate throughout the season, and it appears that the repellent action of the arsenicals, which existed in the small experimental blocks, is not sufficient to drive the mites entirely out of larger areas.

Absorption by plants of arsenic from lead-arsenate treated soil.-- W. E. Fleming, F. E. Baker, and L. Koblitsky, all of Moorestown, N. J., state that in determining the absorption of arsenic by nursery plants growing in plots treated with lead arsenate, the leaves from some deciduous shrubs grown in the experimental nursery sections were analyzed for arsenic. The leaf samples were taken and prepared for analysis in September. The analyses showed the following quantities of arsenic (As_2O_3), expressed as parts per million in the leaves of various plants from soil treated with lead arsenate at the rate of 1,000 pounds per acre: Buddleia variabilis, 0.40; Hydrangea arborescens, 1.20; Hydrangea paniculata, 0.55; Rosa gardenia, 4.60; Rosa Dr. Van Fleet, 1.55; Deutzia lemoinei, 0.50; Spiraea vanhouttei, 0.45; Exochorda grandiflora, 0.15; Berberis thunbergi atropurpurea, 0.05; Symphoricarpos vulgaris, 0.25; Forsythia suspensa, 0.15; Syringa vulgaris, 0.10; Weigela rosea, 0.30; Iris germanica, 1.05; Iris japonica (Stella), 0.30. The quantity of arsenic found in the leaves of plants treated with lead arsenate at the rate of 2,000 pounds per acre averaged more than four times as much as in material from soil treated at the rate of 1,000 pounds per acre.

Oviposition of Tiphia popillivora Roh. (Koivai or type strain) under storage conditions.--M. H. Brunson, Moorestown, reports that a total of 520 females of this imported parasite of the Japanese beetle were collected in the field on August 15 and 26 for the purpose of continuing a study on the oviposition efficiency of the females when held at different temperatures for different periods of time. The females were placed in separate containers in lots of 20, half of them being subjected to a temperature of 50° F. for 5, 10, 15, 20, 25, and 30 days, while the other half were exposed to a temperature of 75° for the same periods of time. At the proper intervals 20 females were removed from the cellars at the two temperatures mentioned and were placed in breeding cans for the parasitization of the host. Nearly all of the adult parasites from the first collection survived all storage periods, including the 30-day period, when stored at 75°. With the exception of those stored 5 days, those held at the higher temperature laid greater numbers of eggs, ranging from 66 per female for the lot put immediately into the breeding can to 16 per female for the lot held 30 days. Practically no eggs were laid by females held at 50° for 25 days or more. The records for the females collected August 26, 11 days later than the first, were quite similar, except that fewer eggs were laid throughout, and very few were laid by females stored 20 days or longer at either temperature.

Permanence of lead arsenate treatments in protecting grass from injury by Japanese beetle larvae.--Messrs. Fleming and Baker report that during the spring of 1929, 560 plots, each of 100 square feet, were established at Moorestown, N. J., to study the permanence of lead arsenate in protecting turf from injury. Concentrations of lead arsenate ranging from 5 to 60 pounds per 1,000 square feet, used alone or with certain fertilizers, were applied and mixed to a depth of 3 inches; then the plots were seeded with standard grass-seed mixtures. Each treatment was replicated seven times. The grub populations during 1929, 1930, and 1931 were too light to permit conclusions. In 1932 and in subsequent years, "attractors" were placed on the plots to draw beetles from adjacent areas and induce them to oviposit in the plots, insuring sufficient infestation to determine the relative value of the different treatments. In making the survey to determine the larval population in the different treatments, 35 square-foot diggings were made in each treatment. The average population in the untreated plots was determined and the percentage reduction in each treatment was calculated. Detailed data will not be given here, but the results indicate that the use of approximately 35 pounds of lead arsenate to 1,000 square feet, mixed thoroughly with the upper 3 inches of soil before seeding, will destroy practically all larvae in a lawn for at least 6-1/2 years after application. The addition of the following fertilizers appeared to decrease the insecticidal action, or its persistence, to a certain extent: Sheep manure, bone meal, hydrated lime, sodium nitrate, superphosphate, potassium chloride, and ammonium sulphate. It is apparent on the sassafras sandy loam soil where these plots are placed that practically complete elimination of the larvae can be assured for a period of 5 years, and the results indicate that recommended treatment may be effective as long as 10 years. The effect of fertilizers on the insecticidal action of lead arsenate is being studied in other experiments.

MEXICAN FRUIT FLY

Fruit fly larvae found early.--During the month of November three larval infestations were found in fruit in the lower Rio Grande Valley. The properties on which the infestations were found were located in the Mission, McAllen, and Edinburg districts. With one exception, this is the only season in which larvae have been found before the first of the year.

Trapping results.--There were only 11 adult Anastrepha ludens Loew taken in traps in November, as compared with 22 in October. Other fruit flies were trapped as follows: A. serpentina Wied., 23; A. fraterculus auct., 6; Anastrepha sp. "X", 1; Anastrepha sp. "Y", 1; A. pallens Coq., 488; Toxotrypana curvicauda Gerst., 1. In addition, 1 A. ludens, 1 A. pallens, and 1 T. curvicauda were trapped in the brush about 60 miles south of the border in Mexico.

Fruit shipments.--Approximately 1,081 cars of citrus fruits were moved by rail within the month.

DATE SCALE CONTROL

No scale found in November.--Inspection was completed in November in the Arabia and Coachella districts in the Coachella Valley, Calif. Inspection has now been completed in 7 of the 12 inspection districts and only 18 properties have yet to receive their final inspection in the remaining 5 districts. A total of 2,797 palms were inspected during November and no scale was found. In the Imperial Valley the Canary Island palms, except those previously infested, have been given their final inspection. Inspection of date palms was continued in the infested area. A total of 677 palm inspections were made during the month and no scale was found.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Lygus damage to alfalfa seed crop in Arizona.--L. L. Stitt, of the Tempe, Ariz., laboratory, has shown by cage records that alfalfa flower "slip" was caused by Lygus sp. and he noted a definite correlation between Lygus population and bloom "slip" in alfalfa fields in Arizona. His observations are reported as follows: "During the past season 20 alfalfa fields were surveyed three or more times to check Lygus population and development. Seed-head samples collected from the fields surveyed were examined at the laboratory for the percent of flower 'slip' and flower set. Fifty racemes taken at random from each sample were checked. Two fields in the Salt River Valley of Arizona gave a perfect correlation between 'slip' and Lygus population in that high population caused a higher 'slip', barring all other causes of bloom 'slip' that might occur in these fields. In the Buckeye and Yuma Valleys of the same State there was a definite correlation between population and 'slip.' For the Buckeye Valley the correlation was 0.643 and in the Yuma Valley it was 0.709. With the results of all three valleys--Salt River, Buckeye, and Yuma--showing a definite correlation between population and the amount of 'slip', it is evident that Lygus was one of the causative factors of flower 'slip' and of a reduction in the alfalfa seed yield. Cage records under controlled conditions have definitely shown that Lygus, both nymphs and adults, caused the flowers to 'slip' and the buds to 'blast.' Most of the Lygus found in the alfalfa were Lygus hesperus Knight."

Cooperative chinch bug agreement signed.--A cooperative project for the purpose of investigating the chinch bug-resistant properties of various varieties of grain sorghum under Oklahoma conditions has been entered into by the Bureau of Entomology and Plant Quarantine and the Bureau of Plant Industry of the Department, and the Oklahoma State Experiment Station. This work is being undertaken at Lawton, Okla.

Varietal and cultural control of the corn borer.--L. H. Patch and G. T. Bottger, Toledo, Ohio, report that the analysis of the data from the 1935 experiments has progressed far enough for a statement of the more obvious results. The results are summarized as follows: (1) A delay in tassel eclosion was effective in reducing the rate of borer survival on each of the three plantings made from May 11 to June 11. These results are in harmony with those obtained in 1934. (2) As compared with the most susceptible hybrid, A X TR, the most resistant hybrid, Hy X R4, contained 51.5, 55.1, and 66.4

percent less borers from a given number of eggs on the three plantings, respectively. The actual numbers of borers per plant were as follows: May 11 planting, 15.00 and 7.27; May 27 planting, 8.58 and 3.85; June 11 planting, 5.33 and 1.79. These large reductions in numbers of borers were due almost entirely to the delay in the tassel eclosion of Hy X R⁴. The time of silking of Hy X R⁴ was only 1.9 days later than A X TR but the delay in the unwrapping of the leaves from around the tassel was 4.5 days in the case of Hy X R⁴. This is seen from comparing the time interval between the appearance of the tassels and the appearance of the silks, the interval being 9.15 days for A X TR and 4.65 days for Hy X R⁴. (3) The tassel eclosion of Hy X R⁴ is delayed by the persistence of the two top leaves to remain tightly wrapped around the tassel much longer than is normal. The mean leaf area of the two top leaves of Hy X R⁴ was 57.5 percent greater than in the case of A X TR. It seems probable that this greater leaf area contributes to the persistence of the tight wrapping of the top leaves and hence to the borer resistance of Hy X R⁴. (4) In the experiment where 42 single, 3-way, and double crosses were planted on May 27, almost all of the variation in the rate of borer survival between the strains can be accounted for on the basis of the time of appearance of the tassels associated with the relative maturity of the strains, the delay in tassel eclosion, and the chance fluctuations in sampling. Only 4 strains showed lower rates of borer survival than might be expected. Three of these were the single cross Iowa L 317 X K.Y.S., the 3-way cross (Ohio 20 X Ohio 32) X R⁴, and the double cross (R⁴ x Hy) X (R⁴ x Iowa L 317). The fourth strain contained two inbreds, 540 and K. Y. S., neither of which showed indications of borer resistance as inbreds. The lower survival of this strain was probably due to chance fluctuations of sampling rather than to inherent resistance. (5) In the experiment where 136 inbred strains of corn were tested, the tasseling and silking dates, the heights, and the leaf area of the different strains were recorded. The presence of leaf wrapping around the tassel was also noted. Time of appearance of the tassels associated with the relative maturity of the inbreds, the delay in tassel eclosion, and the chance fluctuations in sampling, accounted for most of the variation between the strains with respect to rate of borer survival in this experiment, as well as in the preceding one. The relative leaf area of the inbreds per unit of height (bushiness) showed no relation to borer survival. A small group of inbreds, however, showed lower rates of borer survival than might be expected, and it is to these we should look for additional plant characters that would inhibit borer survival.

Rates of damage to sweet corn by European corn borer.--Morris Schlosberg and Ralph Mathes, of the Toledo, Ohio, laboratory, report as follows: "Tests to determine rates of damage to sweet corn by the European corn borer on the basis of use of the corn were continued in 1935, near Toledo, Ohio. Sixteen varieties of sweet corn were tested in four-fold replication in a modified Latin square arrangement at three different levels of borer population. The varieties were chosen to afford a seasonal range of maturing. Each test plot contained 6 rows of 15 plants each, 3 rows being used for canning and market-garden tests and the remaining 3 rows for seed tests. The plants were approximately 10 inches apart in the rows and the rows 36 inches apart. The three different levels of borer population were obtained

from natural infestation and additional hand infestations with one and two egg masses per plant, respectively. The resultant borer populations per plant were determined by dissection of a random sample of 10 plants from each 6-row plot. Total yield results were determined from a random sample of 20 plants from each 3-row plot. Smutted plants and obviously diseased plants were avoided. The ears for market-garden and canning use were harvested approximately 22 days after mid-silking of the plants, and those for seed use at early dent stage. Final curing of the seed-corn samples was continued in wire screen bags hung in an open shed. Canning yields were determined by cutting the kernels from uninjured ears and from injured ears not too severely damaged for use. Market-garden yields were determined on the basis of injury-free ears as one class, and injury-free ears plus injured ears showing at least 4 inches of uninjured kernels around the cob as a second class. Seed-corn yields were determined by removing injured kernels from the ears and shelling the remaining kernels. To facilitate comparisons, the resultant yields of sound kernels were recalculated to 14-percent moisture on the basis of the moisture content of the corn determined at shelling. The resultant data were analyzed by appropriate statistical methods. In general, the data show that higher rates of damage accompanied later maturing. A general increase in yield is also noted with later maturing, although the tendency is less marked where numbers of ears are considered. From data at hand, but not presented in this report, it is evident that the later maturing varieties tended to produce greater total yields by weight, but lesser yields by numbers of ears, than earlier maturing varieties."

Remarkable resistance to hessian fly infestation indicated for strain of spring wheat.--In the course of harvest-time examinations of spring wheat varieties planted by R. M. Caldwell, at Lafayette, Ind., for rust resistance experimentation, one selection, namely, Illinois No. 1, W 38, was observed to show remarkable resistance to hessian fly infestation. Samples of 50 stems each were taken of it and from rows adjoining it in all replications for critical examination. For purposes of ready comparison, the results of these examinations in terms of fly infestation, in all replications are summarized as follows:

Variety	:Repli- : ca- : tions	Percentage infested						Puparia per		
		Plants		Stems				infested stem		
		Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
Ill. No. 1, W 38---	6	17	0	7	6	0	3	2	0	1.1
Adjacent varieties--	12	100	65	93	92	64	76	13	2.4	5.6

It may be noted from this that both the percentage of stems infested and the average number of puparia per infested stem are significantly lower in Ill. No. 1, W 38 than in the varieties adjacent to it. Steps are now being taken to use this selection in making crosses with good winter wheats to produce desirable fly-resistant hybrids. Infestation counts were made at harvest time on a total of 64 varieties and strains of wheat from Dr. Caldwell's leaf-rust nursery. In addition to Ill. No. 1, W 38, mentioned above, two other varieties indicated some resistance to fly.

Hessian fly in fall wheat.--Recent surveys by E. J. Udine show fairly uniform infestations of hessian fly in young wheat plants in the wheat-growing regions of western and central Pennsylvania. The general infestation runs between 20 and 30 percent.

JAPANESE BEETLE CONTROL

Funds for treating Japanese beetle infestations in Detroit, Mich., and in Ohio.--Shortly after the Japanese beetle quarantine hearing on November 16, C. E. Smith, Chief Forester of Detroit, Mich., advised the Bureau that the City Department of Parks and Boulevards will supply 5 tons of lead arsenate for application to all Japanese beetle infestations found this year in Detroit. Mr. Smith has also reported the approval of a W. P. A. conservation project in the city. This project includes funds for labor needed in applying the soil insecticide. A small area was treated with lead arsenate by means of one city-owned sprayer operating for a few days starting November 16. This work was soon discontinued because of lack of funds to pay laborers. Freezing weather shortly after that date made it necessary to postpone this work until spring thaws; however, funds are now available for completion of the soil treatment as soon as possible. Announcement has also been made by E. H. Hanefeld, director, Ohio Department of Agriculture and Conservation, of an emergency appropriation of \$32,500 made available by the Ohio Board of Control for treatment of approximately 250 acres of ground in Ohio cities and towns where Japanese beetle infestations were found last summer. This amount will be available for control work during 1936, so that the treatments may be applied as soon as possible next spring. Two members of the Japanese beetle staff at White Plains have been assigned to survey the infested sections in order to determine more accurately the acreage requiring poisoning.

Japanese beetle quarantine endorsed.--Seventy-five nurserymen, nursery association representatives, and officials from 23 States and the District of Columbia, attended the public hearing held in Washington, D. C., on November 16 to consider the advisability of revoking the Japanese beetle quarantine or extending it to the States of Illinois, Indiana, Michigan, Missouri, Ohio, and North and South Carolina. Representatives were present from all the Middle Atlantic States, 3 New England States, each of the South Atlantic States except North Carolina, each of the eastern North Central States with the exception of Wisconsin, and from Kentucky, Nebraska, Iowa, Missouri, Washington, and Oregon. Testimony at the hearing was almost unanimously in favor of continuing the quarantine. Recommendations were also made that small isolated infestations should not be included in the quarantined area but that every effort should be made to suppress them. Opposition to the quarantine was expressed by two representatives of the Long Island Nurserymen's Association.

Japanese beetle grubs removed from Florida-bound truck.--At the 24-hour-a-day road-inspection station operated on U. S. Route 1 near Fredericksburg, Va., the transit inspector on duty at 11:30 p.m. on November 19 stopped a truck en route from Toms River, N. J., to Daytona, Fla., with 20 bags of soil and 20 cedar trees planted in a large box. The bags of soil were surrendered at the post and the soil was removed from the cedars. Examination

of the soil disclosed 53 larvae. These grubs were determined at the White Plains headquarters as 25 specimens of Popillia japonica Newm., 17 Ochrosidia villosa Burm., 10 Anomala orientalis Waterh., and 1 miscellaneous lepidopteron.

Japanese beetle quarantine violator fined.--In its first prosecution for a violation of the Japanese beetle quarantine in the eastern district of Virginia, a conviction and \$25 fine were obtained. The violation occurred on July 19, 1935, when Stanley Smith, of Manassas, Va., disregarded the road inspector and proceeded toward his destination with a quantity of sweet corn, string beans, and tomatoes obtained in Washington, D. C. The inspector gave chase in his car and overtook the truck about 2 miles from the post. The case was disposed of in the U. S. District Court held at Alexandria on December 2.

Dutch elm disease discovered at three new points.--Culturing of suspects collected by employees of the Bureau of Plant Industry from the Morris-town, N. J., laboratory in test plots of approximately 30 trees each, located at the suggestion of the control division in sections of New Jersey outside this year's scouted area, resulted in the discovery of infection in Union Township, Hunterdon County; Independence Township, Warren County; and Wentage Township, Sussex County. The confirmations, totaling 12, were all obtained from dead trees in swampy areas near the northwestern boundary of the State. These isolated infections extend the New Jersey infected zone from 1,862 to 2,484 square miles and the 10-mile protective zone from 1,021 to 1,135 square miles. The 10-mile protective zone now extends 40 square miles into Pennsylvania. The work area now includes the remainder of Sussex and Hunterdon and all of Warren Counties.

More C. C. C. workers in New York assigned to Dutch elm disease eradication.--The Westchester County Park Commission has assigned part of three C. C. C. camps to Dutch elm disease work in the county for a portion of the winter. These men will work in the Blue Mountain Reservation, Mohansic Park, and Poundridge Reservation.

Eradication personnel.--Total personnel engaged in Dutch elm disease eradication at the end of November numbered 48 appointed men, 12 per diem workers on regular funds, 2,504 P. W. A. workers, 951 C. C. C. enrollees, 21 State-appointed men, and 7 State per diem employees, or a grand total of 3,543.

New England Christmas tree shipments halved.--At the peak of this year's movement of Christmas trees and evergreen decorative material from the New England States, indications are that the total shipments will approximate only 50 percent of those of 1934, according to inspectors now engaged in inspecting these products for gypsy moth infestation. Fewer desirable tree stands and losses to shippers who last year sold their trees on a consignment basis are cited as reasons for the shippers' refusal to again risk an overcutting in excess of their assured sales. Forty temporarily employed inspectors are stationed at the principal Christmas tree shipping centers. The inspection period extends from mid-November to about

December 15. Most of the trees are inspected at Ludlow, Groton, and St. Johnsbury, Vt., Lancaster, N. H., and a few towns near Bangor, Maine. Some of the trees inspected at St. Johnsbury have been shipped to Panama and the British West Indies. Weather conditions for tree cutting and hauling to railroad sidings were quite favorable until Thanksgiving. Since that date, snow and ice have hampered felling and hauling activities.

Steel rails infested with gypsy moth.--Inspection at Syracuse, N. Y., of steel rails removed from an abandoned railroad in New England and shipped to a steel mill resulted in the finding of 39 egg masses. The rails were torn up in the towns of Concord and Rochester, N. H., and at Hardwick, Vt., all points in the area heavily infested with the gypsy moth. Of 19 cars inspected, 10 were found infested. Fourteen of the egg clusters were new and 25 were old. This inspection was performed in cooperation with three inspectors assigned to the work by the New York Department of Agriculture and Markets. Steel rails are not included among the articles quarantined on account of the gypsy moth, and their shipment in this manner is unusual. Watchfulness on the part of the district inspector and local freight agents resulted in the tracing and inspection of the rails.

Bough-lot inspection.--During November, 3,124 evergreen bough lots in southern Vermont and 10 in western Massachusetts were inspected for gypsy moth infestation. With the exception of one lot at Worthington, Mass., all lots were found free from egg clusters. Two egg clusters were found near the Worthington lot, but these were not close enough to justify individual inspection of the boughs.

FOREST INSECT INVESTIGATIONS

Effects of abnormal October temperatures.--J. C. Evenden, of the Coeur d'Alene, Idaho, laboratory, reports that during the latter part of October 1935 abnormally low temperatures occurred throughout the Inland Empire, resulting in some peculiar effects on plant life. Although the temperatures were not excessively low, the minimum reaching zero and slightly below, they followed a long, open fall with but few nights of below-freezing temperatures. As the foliage of deciduous trees had hardly started to fade, the leaves were frozen to the limbs. Many apples had not been picked and the trees now carry a full complement of frozen fruit and brown leaves. The foliage of many ponderosa pine trees is beginning to fade. So far this injury appears to be confined to the 1935 growth of needles. There is no uniformity in its distribution, as the trees showing the injury occur in small groups and as scattered individuals; however, the damage may be more widespread than it now appears. These phenomena are, to a limited extent, similar to those resulting from the sudden drop in temperature in December 1924, which destroyed many ponderosa pine needles throughout northern Idaho and western Montana. Although at that time the injury to the foliage was very severe, only a few decadent trees died as a result of it. This injury to pine foliage results from the freezing of the protoplasm, which causes the needles to turn brown and fall. It is not yet known what effects this sudden drop in temperature had on overwintering bark-beetle broods, but it is doubted that it was sufficiently severe to cause much mortality.

Insects damage saw logs.--W. D. Bedard, Coeur d'Alene, reports that in May the Winton Lumber Company began cutting white pine saw logs on a small area in the Coeur d'Alene National Forest, and that these were left in the woods for several weeks after being cut. This practice, which was necessary for road construction, was a departure from the usual method. In June it was noted that many Dendroctonus monticolae Hopk., Ips van-couveri Sw., and Hylurgops rugipennis Mannh., were attacking these logs. As it is known that the blue stain always associated with bark beetle attacks seriously impairs the sale value of the log, periodic examinations were made to ascertain the extent and rate of injury. In addition to being attacked by bark beetles, all logs still in the woods after the middle of July were attacked by the long-horned woodborers, Monochamus scutellatus Say, M. oregonensis Lec., and M. notatus Drury. As all logs had been placed in the river by the end of August, a final examination was made of them on September 27. The stain had then developed to a heavy blue over the entire circumference and had penetrated almost all of the sapwood. In addition, 50 percent of the logs contained heavy broods of the long-horned woodborers.

Brood counts of native elm bark beetle.--C. E. Hoffman and C. L. Griswold, of the Morristown, N. J., laboratory, have counted the numbers of egg tunnels and larvae of the native elm bark beetle (Hylurgopinus rufipes (Eich.)) in two samples of bark taken from elm trees cut this fall in a swamp at Mt. Hope, N. J. Beavers had previously built a dam in the area and the subsequent flooding had gradually killed the trees, many of which were elm. As a result, a heavy population of H. rufipes had been built up. The samples of bark examined by Messrs. Hoffman and Griswold were from the most heavily infested material available. In 1 square foot there were 46 egg tunnels from which 1,211 larvae had developed. Another square foot of bark contained 52 egg tunnels and 1,217 larvae.

Hibernation of adults of native elm bark beetle.--It has been recorded in literature that adults of H. rufipes make hibernation burrows in the bark of elm. This habit has been noted in New Jersey this fall by R. R. Whitten, of the Morristown laboratory, and an instance of beetles entering bark in large numbers in an upland swamp in Danbury, Conn., has been brought to the attention of the laboratory by L. R. Fate, State leader in Dutch elm disease eradication. The beetles have been found to make such burrows in the bark of recently cut elm, as well as in the bark of perfectly healthy standing trees.

Longevity of elm leaf beetle.--During May 1935 a large number of adults of the elm leaf beetle (Galerucella xanthomelaena Schrank) were received at the Morristown laboratory for use in transmission experiments with the Dutch elm disease fungus. These beetles were collected as they were leaving hibernation quarters in Woburn, Mass. When the beetles were received at Morristown they were placed in large glass jars covered with cloth. The jars were kept in a screened insectary and the beetles provided with fresh elm foliage. Beetles needed for the experiments were taken from the jars from time to time and it was finally decided to ascertain how long the remainder would live. The last two adults of lots

received between May 21 and May 28 died on or about November 11. Egg clusters were noted as late as August 27 and feeding as late as September 20, after which the number of remaining living beetles gradually decreased.

Life history note on *Diprion polytomum* Htg.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports on the life history of *D. polytomum* in southern Connecticut as follows: "It is apparent that there was a partial fourth generation this year. Larvae of second to sixth instars were found at Orange, Conn., on November 1, 8, and 19, and on the last date larvae of the first instar were also found. An adult female was taken in the field on November 1. Following a cold wave on November 24-25 (the lowest temperature at the plantation being 18° F.), an examination was made on November 26. Larvae were very scarce, only two living ones (of the fourth instar) being found. None of the very early instars were found. Apparently they had not been able to survive the freezing temperature. From time to time during November adult flies, all females, emerged from material collected from New Hampshire, Connecticut, and New York."

Oak twig dieback.--Mr. MacAloney also reports that the results of an investigation carried on jointly with J. R. Hansbrough, of the Division of Forest Pathology, show that the dying back of oak twigs, so prevalent in central Massachusetts on cut-over cordwood land, is due almost entirely to winter-killing of the buds or late spring frosts after the buds have opened. Of 500 twigs examined throughout the period, only 17 were killed by insects. Tree-hoppers and gall flies accounted for 13 of these, and tent caterpillars and gypsy moth larvae each killed two. No primary fungus was found on any twigs. Three hundred and sixty-two of the twigs were injured by freezing and 142 of these died back appreciably.

European pine shoot moth reduced at Brookline, Mass.--J. V. Schaffner, Jr., New Haven, reports that red pine in ornamental plantings in Brookline, Dedham, Newton, and Belmont, Mass., which had been heavily infested by the European pine shoot moth in the summer of 1933, showed a decided improvement this season. Trees that were badly misshapen have made a good growth and it is believed that by careful pruning they may be saved for ornamental purposes. The shoot moth infestation has practically disappeared, owing to the heavy winter mortality in 1933-34.

Notes on *Itoplectis montana* Cush.--P. B. Dowden, New Haven, reports on the parasite *I. montana*, reared from cocoons of the hemlock sawfly (*Neodiprion tsugae* Midd.) received from F. P. Keen, Portland, Oreg. These parasites were imported into the New England area with the hope that they might attack the recently discovered *D. polytomum* in that region. Mr. Dowden says: "This season's observations on *I. montana* were practically completed in November. Two hundred and eighty-eight more *D. polytomum* cocoons were attacked during November 12-14, and an adult female issued November 30 from cocoons attacked in the laboratory on October 18. A colony of 100 males and 100 females was liberated at Orange, Conn., and one of 174 males and 116 females at Macedonia Brook State Park, Conn. Adults issuing from *N. tsugae* cocoons used in reproduction work were placed in hibernation on November 16, but most of them have died. Forty males and 33 females that issued between November 8 and 16, however, are living well in hibernation."

Parasites of larch sawfly.--Mr. Dowden reports that dissection of larch sawfly cocoons received from the Flathead National Forest in Montana and from Deer River, Minn., sent by J. C. Evenden and L. W. Orr, respectively, shows that hymenopterous larvae as well as tachinid larvae from both regions appear to be identical, although positive determination will be impossible until adults are reared. The object of this study is to determine the sawfly parasites present. If all species do not occur in both regions it is planned to transport parasites from one region to the other until the same parasitic fauna is established in both. Additional collections of cocoons have been received from Mr. Orr from four other localities in the Lake States region.

Parasitization of elm leaf beetle.--P. A. Berry, New Haven, has made a study of the parasitization of elm leaf beetle pupae by Tetrastichus sp. at five localities in eastern Massachusetts. Collections for records of percentages of parasitization at the different localities were made at approximately weekly intervals from July 16 to August 14. A distinct increase in percentage of parasitization occurred during this period at all localities. At three of the points the percentage doubled, while at one point it increased from 7 to 83 percent. Pupae collected on the tree were invariably parasitized to a greater degree than those collected on the ground. In general, the degree of parasitization was lower than in 1934.

Forest-type survey.--W. L. Baker, New Haven, reports that a forest-type survey was conducted in the town of Savoy, Mass. Significant findings in this town were the total absence of oak in all of the 50 plots surveyed, as well as the fact that not an oak was seen in the town. Favored food predominated in only 4.6 percent of the forested plots surveyed. Not a single egg cluster was seen in the town.

Relation of leaf structure and spray deposit.--S. F. Potts, New Haven, reports that recent investigations of the effect of light and competition on leaf or needle structure at the top and bottom of open and closed stands, and the result of this effect on spray deposit and on insect feeding have been undertaken. The data on feeding, growth rate, and mortality is limited, but shows a very definite favorability of "sun" leaves over "shade" leaves for the several species of chewing insects observed. Deciduous leaves give about the same degree of variation between shade and sun leaves, while conifers differ considerably in the area exposed per given weight, as indicated by comparing white pine, red pine, spruce, and hemlock. The difference in area per given weight or leaf or needle at the bottom of trees, as compared at the top, varies with stand density and is one factor explaining the difference in insecticidal deposit per given weight of foliage at the different levels and densities of various types of growth.

GYPSY AND BROWN-TAIL MOTH CONTROL

Progress in gypsy moth control.--Up to November 15, under the W. P. A. projects, the numbers of workers employed in gypsy moth control in the different States were as follows: Maine, 52; New Hampshire, 79;

Vermont, 407; Massachusetts, 515; Rhode Island, 65; Connecticut, 537; New York, 173; New Jersey, 70; Pennsylvania, 738; total 2,666. During the second week in November an average of 1,976 men, from C. C. C. camps, were employed on gypsy moth work in the area east of the Barrier Zone. They were assigned as follows: New Hampshire, 119; Vermont, 540; Massachusetts, 740; and Connecticut, 577. During the last week in October over 162,000 new gypsy moth egg clusters, most of which were in Massachusetts, were creosoted by C. C. C. men. During the same week considerable time was lost in some of the States owing to the closing of forest areas because of the fire hazard. A decrease in the number of men doing gypsy moth work east of the Barrier Zone has been brought about by the abandonment of several C. C. C. camps, and by some of the camps having reduced their quotas from 250 to 200 men. Some of the men from 43 different camps are doing gypsy moth work, 12 of these being in Vermont, 3 in New Hampshire, 18 in Massachusetts, and 10 in Connecticut. Of these camps, 12 have quotas of 100 or more men promised for gypsy moth work, the others from 20 to 60 men per camp. By the end of November slightly more than 2,800 W. P. A. workers (the total provided for in the set-up) were engaged in gypsy moth scouting, thinning, and treatment work. These workers were obtained through the National Reemployment Service, more than 95 percent of them being drawn from relief rolls. Because of employment conditions it was not possible to assemble these men in areas where gypsy moths were abundant for approximately 2 weeks' training, as has been done in the past; therefore, in areas where little or no infestation was known to exist, it was necessary to train these men for scouting with artificial egg clusters. Where infestations have been found outside the Barrier Zone since work was started, W. P. A. workers scouting in neighboring towns have been transported to the infested area in order that they might have an opportunity to see egg clusters deposited under natural conditions. This has resulted in the workers showing more interest in their work. Supervisors in charge of thinning operations are directing their crews so that growth most favorable to gypsy moth development is given first consideration for removal, rendering the remaining stand more resistant to the development of this insect. In the Pennsylvania area much thinning and cleaning is being done in localities where tree tops previously cut for mine props cover the ground and make thorough scouting expensive and extremely difficult. The cleaning of these areas will be of permanent benefit. To date 5 new and 1 old egg clusters have been found in Derby, Vt., a town located east of the Barrier Zone and bordering Canada. This town is not, at present, under quarantine on account of the gypsy moth. All egg clusters located have been destroyed by creosoting, and thinning work will be done in the area as soon as possible. As a considerable number of Christmas trees are normally cut in Derby each year, the precaution was taken by this project to determine where trees would be cut this season and to arrange to have these areas carefully examined before trees were cut and removed. Fortunately, most of the operators who normally cut trees in Derby were obtaining their trees this season across the border in Canada. In fact, only one operator planned to cut trees in Derby this year and his work was confined to two areas, both of which had been examined by W. P. A. workers of this project with negative results. During the summer of 1934 three adult male moths were caught at an assembling cage in Foster Township, Luzerne County, Pa., but no infestation was located there as intensive scouting had

been carried on during the fiscal year. However, it was noticed that a stone wall had been recently removed and it was learned that the stones from this wall were used in road-construction work nearby. Two moths were taken from tanglefoot at an assembling cage placed in the same locality during the summer of 1935 and an infestation has recently been discovered in that vicinity. From the information at hand, it appears that an infestation existed in this locality during the fiscal year 1935, but all egg masses were deposited on the stones used for road-construction work. Apparently some of the egg masses were broken in handling the stones, which explains why male moths were captured at the cage this summer and egg clusters were recently found. Tree growth between the wall apparently infested in 1935 and the place where the stones were used for road-construction work has been carefully examined and no infestation found. During the last 2 weeks of November a total of 250 new pick-up trucks were delivered at the storehouse at Greenfield, Mass. In order to meet the safety requirements, considerable work was necessary to put them in condition for the field. These trucks are being sent into the field as quickly as they can be conditioned. In Pennsylvania during the latter part of the month 21 pick-up trucks and 16 1-1/2-ton trucks were delivered at the storehouse at Wilkes-Barre. All of these were placed in immediate use. Recently a shipment of rails from an abandoned railroad was made from a point near Rochester, N. H., to a steel plant in Syracuse, N. Y. These rails were shipped in box-cars and placed on the company's siding near the plant. On inspection by the men of the New York Conservation Department, gypsy moth egg clusters were found on some of them. A number of cars were inspected before these were discovered.

Brown-tail moth food plants destroyed.--On November 15, under the W. P. A. emergency project, the numbers of men employed on brown-tail moth work were as follows: Maine, 93; New Hampshire, 359; Massachusetts, 375; total, 827. Under the W. P. A. brown-tail moth project most of the work has consisted in the removal of favored food plants, principally old apple trees, wild cherry, small useless white oaks, and a few other species. These cutting operations have been performed in localities where infestations have been persistent. At a considerable number of localities the trees cut bore brown-tail webs and these were removed and destroyed. Up to the second week in November over 75,000 trees were cut in Maine, New Hampshire, and Massachusetts and, in addition to this, 461 acres grown up to wild cherry were cut over. Any parts of the trees that would be useful as firewood were cut and the brush and slash piled and later burned. During the chopping work 13,155 brown-tail webs were removed and destroyed in Maine, 7,693 in New Hampshire, and 8,963 in Massachusetts.

PLANT DISEASE CONTROL

Notes on barberry eradication.--On December 15, 2,260 men were employed on barberry eradication in 15 States. Field work had been discontinued in Montana and North Dakota until spring. Reports from the field indicate that approximately 1,000 men will be given continuous employment during the winter months. Their work will be restricted largely to a survey of some of the larger cities in Ohio, Minnesota, Illinois, Iowa, and

Nebraska. In Minnesota work in the hill areas of the southeastern part of the State will be continued. There will also be considerable rural work done in Colorado, Indiana, Iowa, Missouri, Pennsylvania, and Wisconsin. The extent of winter work in Virginia and West Virginia will depend on weather conditions. Francis B. Powers, in charge of barberry-eradication work in Michigan, reports that two widely separated groups of counties have been included in the areas to receive attention of survey crews. One group is composed of the several counties bordering the shore line of Lake Michigan and the inland counties of Wexford, Missaukee, Lake, Osceola, and Newaygo; the second group, on the eastern side of the State, includes Huron, Sanilac, St. Clair, and Macomb Counties, and the inland counties of Genesee, Oakland, and Lapeer. Conditions under which work has been conducted vary widely. Some of these counties are in the resort areas, others in the sparsely populated parts of the State where the original plantings of bushes were not numerous but where some spreads have taken place. Since January 1, 1935, approximately 70,000 bushes have been eradicated on 800 different properties, and 287 different persons have been given employment since July 1. Ten of these constituted a part of the supervisory personnel and were paid by the State of Michigan; 14 are under appointment with the United States Department of Agriculture; and the remainder have been taken from relief rolls. Since 1931 work with school groups in 33 counties in Indiana has resulted in 126 boys and girls reporting approximately 150 different properties on which barberry bushes were growing. These reports have led indirectly to the eradication of many more bushes. W. E. Leer has submitted the following brief report covering recent activities in connection with this project in his State. "During November 1935 study materials were sent to all of the high-school principals and science teachers and to the grade teachers having pupils in the fifth, sixth, seventh, and eighth grades in these 33 counties. From the close of the school term last spring until about November 10, 1935, only 1 barberry location was reported by a child. However, during the period November 11 to 30, 1935, 9 boys and girls reported barberry locations (figures not included in totals given above). These results merely confirm the prevailing idea that the intensive school work must be followed up if maximum results are to be realized. Survey activities in Indiana were increased beginning in August 1935, as the result of the grant of W. P. A. funds. Crews of 11 relief laborers and 1 crew foreman were organized in Lake, Porter, La Porte, Elkhart, Lagrange, Allen, Wabash, Fayette, Wayne, and Franklin Counties. Intensive survey work is being done in these counties. It is planned to work during the entire winter, unless the weather becomes unusually severe. City survey work will be carried on when weather conditions are not satisfactory for rural survey. Approximately 1,618 square miles were surveyed from August 1 to November 30." During August and September L. M. Ames inspected 27 nurseries for rust-susceptible barberries. These inspections were made as a result of requests for permits to ship species of barberries into or between protected States. During the past 6 months Mr. Ames has made approximately 150 separate identifications of specimens of barberry, either intercepted in the mail by quarantine officials or sent in for identification by nurserymen. He reports much closer cooperation on the part of State nursery-inspection organizations, as they are becoming better acquainted with the purpose of the work and the provisions of the quarantine. In many States inspectors

are making a record of all barberries, other than the Japanese variety, found during their inspections of other shrubbery. This procedure will aid materially in bringing about a clean-up of the smaller nurseries, especially those that sell only to local customers.

New record in blister rust control.--Accomplishments in Ribes eradication in the Northeastern States during the field season of 1935 established a new record for such yearly activities in this region. An area of about 1,100,000 acres was cleared of over 27,000,000 currant and gooseberry bushes. This acreage represents an area about one-fifth the size of Massachusetts. The work was performed under five programs: Regular cooperative work, E. C. W., E. R. A., P. W. A., and W. P. A. Nearly 400,000 man-days of employment were given to needy workers on this phase of the control project.

Heavy blister rust infection found in unprotected pine plantation in Maine.--Observations were made recently of blister rust conditions in a white pine plantation at Moxie Gore, Maine. The trees were planted in 1916, and now average about 20 feet in height. No protection measures have been applied. In the acre plot examined, 89 percent of the 887 pines were infected and 39 percent of the total trees had already been killed.

COTTON INSECT INVESTIGATIONS

Effect of excessive amounts of calcium arsenate on following crops.--R. C. Gaines and M. T. Young report concerning a test that has been conducted for 5 years on the same plots at Tallulah, La., where large quantities of calcium arsenate have been broadcast on the soil and harrowed in just prior to the planting of cotton. Calcium arsenate was applied at the rate of 400 pounds per acre each year, or a total of 2,000 pounds to one plot, while the adjoining plot has been left as an untreated check. Cotton has been planted on these plots each year. During the first 2 years the untreated plot produced more seed cotton per acre than the treated plot, but during the last 3 years the treated plot has led in yield. The average yield of 1,778 pounds per acre for the treated plot, as compared with 1,795 pounds for the untreated plot, shows a difference of 17 pounds, or 1 percent, in favor of the plot without calcium arsenate. These results indicate that in the fertile Mississippi River Delta soil of Madison Parish, La., there appears to be no danger of reducing the yield of cotton, even by the excessive use of calcium arsenate. Under ordinary farm conditions, probably more than 100 years would elapse before 2,000 pounds per acre would be applied to cotton for boll weevil control. In 1934 and in 1935 soybeans and cowpeas were planted on a small part of both treated and untreated plots. Both crops grew normally on the untreated plot, but on the treated plot the young plants died, none of them reaching maturity.

Disease of cotton leaf worm pupae.--C. F. Rainwater reports that Alabama argillacea Hbn. appeared at Florence, S. C., early in August this year but never became really abundant and only an occasional field was stripped in August and September. In October the number of larvae in the fields was apparently still less and cotton made a second growth. Several hundred pupae were collected to determine what factors were holding them

in check. A few were parasitized by Brachymeria ovata (Say) but not enough to account for the reduction in population. Most of the pupae became hard and brittle externally and the interior was whitish and granular. Only a small percentage produced moths. In the diseased pupae the parasites, when present, were also killed.

Cotton flea hoppers on flight screens.--K. P. Ewing and R. L. McGarr report that less than half as many cotton flea hoppers were taken on the tanglefoot flight screens at Port Lavaca, Tex., this year as in 1933 and 1934.

Cotton flea hopper control tests.--Reports from Messrs. Ewing and McGarr, of Port Lavaca, show that the increase in yields from field tests for cotton flea hopper control were not as large as those obtained in former years. A total of 42 1-acre plots and 341 acres were used in large-scale field tests. Of these plots, 11 showed a profit and 13 a loss from dusting. The average net profit from the 24 sulphur-dusted plots was \$1.40 per acre, the lowest ever obtained in this region. The 6 plots dusted with the so-called "wet mixture" of 75 percent calcium arsenate and 25 percent paris green produced gains of 122 to 410 pounds, averaging 217 pounds of seed cotton and \$3.95 profit per acre. In the three plots in which the wet mixture was directly comparable to the "dry mixture" of 75 percent calcium arsenate and 25 percent paris green, the average gains were 237 pounds for the wet mixture and 221 pounds for the dry.

Pink bollworm parasite work.--The work of the present year on parasites of the pink bollworm was reported by A. J. Chapman and L. W. Noble of the Presidio, Tex., laboratory, as follows: Microbracon kirkpatricki Wilk.: 40,000 were shipped to Puerto Rico from which 36,000 adults emerged; 15,000 liberated at Torreón, Mexico, and 15,000 at Las Delicias, Mexico, in cooperation with the Mexican Department of Agriculture; 5,200 sent to Tallulah, La., for experimental purposes; 52,000 liberated in fields near Presidio. Recoveries have been made from field-collected bolls in Puerto Rico and at Presidio. Chelonus blackburni Cameron: 4,615 liberated at Presidio, where recoveries have been made from field-collected bolls. Exeristes roborator Fab.: 2,000 shipped to Puerto Rico; 4,000 liberated at Las Delicias, Mexico, in cooperation with the Mexican Department of Agriculture; 4,500 placed in cold storage at Presidio. Elasmus platyedrae Ferr.: Breeding stock was maintained but no liberations were made. Microbracon mellitor Say. (Hawaiian pink bollworm strain): Experimental work on breeding methods conducted but no liberations have been made.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Most of the gin-trash inspection during the month was carried on in the Western Extension of Texas, in the regulated area, and adjacent territory. On the whole, conditions were satisfactory and a considerable amount of trash was inspected without finding any re-infestation. Regulatory inspectors continued to examine all of the trash in the regulated areas of Florida and Georgia during the first half of the

month, after which ginning was so irregular that it was impracticable to continue the inspections. The results in these areas have also been negative. Toward the close of the month two machines were sent to the Salt River Valley of Arizona for additional inspection. As a result of inspections carried on by regulatory inspectors, pink bollworms have been found this season in the El Paso and Pecos Valleys of Texas, the Mesilla Valley of New Mexico, and the Safford area in Arizona. In Pima County, Ariz., inspections have been made but no pink bollworms found. During the latter part of the month, however, 7 specimens of the *Thurberia* weevil were taken, all of which apparently came from cotton produced south of Tucson. All of the weevils were taken from Pima or long-staple cotton. Thus far no weevils have been found in the main cotton area at Marana, northwest of Tucson.

Field clean-up in Big Bend of Texas.--The cleaning of cotton fields in the Big Bend area of Texas got under way early in November. The clean-up has not gone forward as rapidly as was hoped, as a top crop of bolls is being produced and farmers have been somewhat slow to complete picking; also because the crop is from 2 to 3 weeks later this year. At the close of the month a little less than 200 acres had been cleaned; however, this small acreage was in fields containing the largest number of worms. The remaining acreage will probably be completed during the first part of the coming month.

Road-station inspection.--Four of the interceptions made at the Marfa, Tex., road station in November were found to be infested with the pink bollworm. Of this number, three contained one living larva each, and one also contained a dead worm. On November 14, 1-5/8 pounds of seed cotton were taken from a truck. This small quantity of seed cotton contained 307 living and 11 dead larvae and 8 pupae. This is perhaps the largest number of worms ever intercepted at one of our road stations.

Eradication of *Thurberia* plants in Arizona.--The eradication of *Thurberia* plants in southern Arizona, with W. P. A. funds has made excellent progress during the month, where it is still being carried on in the Tortillita Mountains north of Tucson. During the month approximately 24,000 acres were covered, from which some 2,500 plants were removed. Part of this acreage contained a large number of plants in former years but during the past few years it has been heavily pastured with goats, so that very few plants are being found at this time.

Wild cotton eradication in Florida.--The eradication of wild cotton in southern Florida was resumed during the last half of November. This work is also being carried on this season with W. P. A. funds. There has been some difficulty in obtaining the desired number of laborers, owing to the fact that many of them were being utilized to repair the damage caused by the tropical storm which passed over southern Florida early in September. It is hoped to have the full quota of men at work within the near future. Some 125 acres had been covered by the end of the month, from which 2,087 mature, 27,166 seedling, and 14 sprout plants were removed. All but 37 of the mature plants were on acreage not previously cleaned.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Pyrethrum-oil sprays control beet leafhopper, tests indicate.--Preliminary reports submitted by V. E. Romney, Phoenix, Ariz., and G. T. York, Modesto, Calif., who are engaged in investigations of Eutettix tenellus Bak. in the Arizona-New Mexico area, indicate promising results in controlling this pest on seed beets by applying an atomized pyrethrum-oil combination spray to the plants. In field tests conducted in the Salt River Valley of Arizona and in the Mesilla Valley of New Mexico, it was determined that from 85 to 97 percent of the leafhopper adults and nymphs were killed by this treatment. These results were obtained on three sample plots each in New Mexico and Arizona.

Adding sulphur to Mexican bean beetle insecticides controls powdery mildew on beans.--The results of recent field tests performed by L. W. Brannon, of the Norfolk, Va., laboratory, indicate that when powdery mildew occurs on snap beans in association with Mexican bean beetle infestation, control of both the insect and the disease may be obtained by the addition of wettable sulphur to the sprays recommended for the bean beetle, or by the use of sulphur as a diluent for dusts used against this insect. Best results were obtained by adding 2 pounds of wettable sulphur to derris root or cube root powder suspensions containing approximately 0.02 percent rotenone and by the use of derris or cube dust mixtures containing approximately 0.5 percent rotenone, with sulphur as a diluent. Satisfactory results were also obtained with a dust mixture containing 60 parts of synthetic cryolite and 40 parts of sulphur by weight.

Reduction of soil moisture decreases wireworm populations.--K. E. Gibson, of the Walla Walla, Wash., laboratory, reports that recent examinations in experimental fields in which normal irrigation was withheld have revealed that this drying-out process in alfalfa fields resulted in reductions in wireworm populations ranging from 55.5 to 74.2 percent, with an average of 65.5 percent, as compared to similar fields in which normal irrigation practices were followed. In one wheat field similarly treated a reduction of 81.8 percent occurred in wireworm population. The principal wireworm species involved were the sugar beet wireworm (Limonius cali-fornicus Mann.) and the Pacific coast wireworm (L. canus Lec.). These experimental fields will be planted to potatoes in 1936 and observations will be made on that crop in order to evaluate the effectiveness of this proposed method of wireworm control.

Pea weevil infestation in Palouse district of Washington and Idaho shows decrease in 1935, as compared to 1934.--T. A. Brindley, of the Moscow, Idaho, laboratory, reports that, according to the examination of samples of peas from a total of 1,578 fields grown in 72 localities in Washington and Idaho in 1935, an average of 3.34 percent of the peas were infested by the pea weevil, these figures being based on information supplied by the pea-grading service of the Bureau of Agricultural Economics. A total of approximately 125,704,461 pounds of peas were involved in the aggregate yield from which these samples were taken. The average infestation for the different localities ranged from a maximum of 63.7 percent to zero. The

and of Aedes aegypti L. 71 times. The negative collections for Culex were due to flushing, oiling, drying, or filling of some of the basins at different times. A. aegypti larvae were not found in any of the basins until September 27, but after this date several of them contained larvae of this species on each occasion. The estimated average number of larvae for the positive collections was about 20 per dip for Culex and about 3.3 per dip for A. aegypti.

Hatching of Aedes vexans Meig.--H. H. Stage, Portland, Oreg., reports that the collecting and flooding of a number of soil samples have been continued for ecological studies. Samples taken in nature in September produced a hatch of 83 percent A. vexans; those taken in October, 7 percent; and those in November, none. Samples taken in August from Sauvies Island before the fall rains, left under a shelter where they remained dry but at the same time were exposed to outside temperatures, gave hatches as follows: September, 76 percent; October, 7 percent; and November, none. These data indicate that low temperatures are responsible for nonhatching of eggs during the cold months, and that moisture has little or no effect.

Effect of infestation by Cochliomyia macellaria Fab. following infestation by C. americana Cushing and Patton.--At Valdosta, Ga., tests have been conducted on experimental animals to determine whether or not infestation of animal wounds by C. macellaria following infestation by C. americana conduces to the healing of the wounds. Four goats were used, each of which received two identical wounds, one on the right hip and one on the left. All wounds were artificially infested with C. americana larvae. After these had matured and dropped, one of the wounds on each animal was artificially infested with C. macellaria larvae. The other wound on each animal was left untreated. At the conclusion of the tests no significant difference was noted between the infested and the noninfested wounds.

Attack by screw worm and related flies on wounded animals.--A series of tests was conducted at Valdosta during October and November with artificially wounded animals for the purpose of obtaining data on infestations of the secondary screw worm (C. macellaria) and other blowflies when the primary screw worm (C. americana) is kept under control. When eggs were deposited by C. americana these were carefully removed, but all others were left undisturbed. Eleven goats, 11 sheep, and 5 calves were used. During the period when wounds were attractive, C. americana deposited 307 egg masses on the wounds. C. macellaria initiated infestations in 4 wounds out of 63. One sheep died as a result of infestation by this species. In this case the fleece about one of the wounds was unclipped. Sarcophagid larvae initiated infestations in 7 out of 63 wounds. None of these were fatal. None of the 63 wounds received initial infestations from larvae of Phormia but these larvae were present as a result of reinfestation in three cases. Lucilia larvae initiated infestation in only one case.

Seasonal activity of C. americana and daily activity in relation to air temperatures.--From observations made on the experimental farm at Valdosta on five series of wounded sheep, goats, and cattle the following conclusions have been drawn: (1) There has been no apparent decrease in

activity of this fly during the first 3 weeks of November. (2) It appears to be as active on days when the maximum air temperature is 75° F. as on days when it is 80° to 85°. (3) Maximum air temperatures 70° or below greatly decrease activity of adults. (4) Eggs were deposited on the wounds of animals when air temperatures were as low as 63.5°. (5) No eggs have been deposited on the wounds of animals when the maximum air temperatures were 60° or below. (6) Air temperature as low as 24° did not kill the adults in nature. (7) The numbers of egg masses are noticeably increased on warm days following days too cold for oviposition.

Effect of varying numbers of *C. americana* and *C. macellaria* larvae in wounds of sheep.--In a series of tests to determine the number of larvae per pound of body weight of sheep necessary to kill the animal, the following results have been obtained: Sheep died as a result of *C. americana* larvae in doses as low as 12.96 larvae per pound. For *C. macellaria* the minimum fatal dose was 33.95 larvae per pound.

Hosts of the Gulf coast tick.--One hundred and eleven specimens of birds and small mammals have been collected from several localities in Georgia and examined for the Gulf coast tick. Larvae have been taken from sheep, common gray squirrel, fox squirrel, cottontail rabbit, blue jay, mocking bird, towhee, house wren, meadow lark, bobwhite, and migrant shrike. The nymph has been collected from the meadow lark, house wren, and sheep. The meadow lark is the principal host of both forms. As many as 289 have been collected from one bird.

Biological notes on Gulf coast tick.--Experiments on the effect of low temperatures on unengorged nymphs of *A. maculatum* Koch were completed in November by Carroll Smith, of the Washington office. In general, no ill effects were noticed at temperatures as low as 5° F., while many ticks survived at -5°. At -7° and below none survived. Molting records were completed on 514 engorged larvae. The period from dropping to molting ranged from 15 to 23 days. Unengorged larvae accepted as hosts English sparrows, juncos, and quail.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--On October 2, 1935, five living mature larvae of the Mediterranean fruit fly (*Ceratitis capitata* Wied.) were taken at New York out of a peach discarded by a passenger from the Mediterranean region and abandoned in a wastepaper basket in a stateroom on board ship. A living adult of *Sitona japonica* Roelofs arrived at San Francisco on September 25, 1935, in packing for baggage from Japan. This weevil is a pest of the roots of *Astragalus sinicus* in Japan. One living and one dead larva of the bean pod borer (*Maruca testulalis* Geyer) were found at San Juan, P. R., on September 20, 1935, in two string beans in stores from Venezuela. This represents the first record in our files of this pyralid being intercepted from Venezuela. Two living adults of the weevil *Cossonus spathula* Boh. were taken at New Orleans on August 18, 1935, under the bark of a hardwood log in cargo from Mexico. A living specimen of the coreid *Capaneus vates* Stal arrived at Charleston, S. C., on September 20, 1935, with banana debris in cargo from Guatemala. Three living larvae

of the European corn borer (Pyrausta nubilalis Hbn.) were intercepted at Seattle, Wash., on September 18, 1935, in green corn in ship's stores from Japan. The larvae were boring in the cobs at the base of the ears. A living specimen of the cicadellid Nephotettix apicalis Motsch. was taken at Honolulu, Hawaii, on September 11, 1935, on Lilium sp. in ship's quarters from the Orient. Adults of dead Bruchus rufipes Hbst. were found at Washington, D. C., on March 21, 1935, in seed of Vicia sp. in the mail from the Union of Soviet Socialist Republics. A living specimen of the chief earwig (Prolabia arachidis Yersin) arrived at Eagle Pass, Tex., on August 21, 1935, on a sour lime in cargo from Mexico. This earwig occurs outdoors in southern United States. Six living larvae of the turnip gall weevil (Ceutorhynchus pleurostigma Marsh.) were intercepted at Philadelphia on October 25, 1935, in galls on white turnips in stores from Denmark. One dead and six living larvae of the pink bollworm (Pectinophora gossypiella Saund.) were found at Norfolk, Va., on September 2, 1935, in three cotton bolls in quarters from Montserrat, British West Indies. This is our first record of this insect being intercepted from Montserrat. A living larva of the scarabaeid Anomala aenea De G. arrived at Boston on October 2, 1935, in soil around the roots of plants (Heuchera sp.) in the mail from Sweden. A. G. Boving states that this species is injurious to nurseries.

Pathological interceptions of interest.---The first interception of Cercospora cruciferarum Ell. & Ev. was made at New York on November 11, the host being radish leaves from Colombia. The first interception of Coleosporium ipomoeae (Schw.) Burr. was made at Brownsville, Tex., on October 31 on a morning-glory leaf from Mexico. Diplodia tubericola (Ell. & Ev.) Taub. was intercepted at Mobile on November 6 in malanga root from Spanish Honduras. The only previous interception of the disease on this host was from the Dominican Republic. A dead Vespina wasp picked up at New Orleans on October 23 in banana trash from Mexico was infected with a fungus determined as Hirsutella sp., probably H. saussurei (Cke.) Speare, our first interception of the genus. Puccinia chrysanthemi Roze was intercepted from England for the first time on October 15 at New York. Sclerotinia cinerea (Bon.) Schroet. was intercepted on pear for the first time on October 17 in fruit from Italy at New York. Septoria aucubae West was intercepted on Aucuba japonica leaves from Italy on October 17 at New York, the only previous interception being on a plant of unknown origin.

Tuckahoe potato may occur in China.---A growth about the size of a baseball was intercepted at Seattle on October 15 in baggage from China. This growth proved to be a Sclerotium sp. closely resembling the sclerotial stage of Poria cocos (Schw.) Wolf, often called Tuckahoe potato and reputed to have been used for food by the Indians of the eastern part of this country. Like the American form, the Chinese specimen appears to have developed on the root of a pine tree. So far as the specialists consulted are aware, no such fungus had ever been reported from China.

Five new nemas named.---Five of the new species of nema intercepted last year have been named by G. Steiner, of the Division of Nematology of the Bureau of Plant Industry, as follows: Acrobeles glaphyrus Steiner in tuberoses from Mexico (see p. 24 of the January 1935 News Letter); Anguillulina gallica Steiner in elm from France (see p. 21 of February 1935 News

letter); Anhelenchoides hunti Steiner in tiger lily from Japan (see p. 24 of the January 1935 News Letter) and in husk tomato from Mexico (see p. 20 of the July 1935 News Letter); A. solani Steiner and Cephalobus cubaensis Steiner in potato from Cuba (see p. 21 of the June 1935 News Letter).

Wholesale collecting on Guatemalan material.--A shipment of special permit plants from Guatemala was inspected at San Francisco on November 12-14. All of the plants were more or less infested, and numerous insects and other zoological material including snails, earwigs, slugs, and worms were found in soil about the roots. Ferns yielded a list of 21 different items; Ficus sp., Chrysomphalus aonidum (Linn.) only; orchids, a list of 46 items; palms, 6 items; and packing, 7 items. Some of these items belong to groups of economic importance, including Curculionidae, Lygaeidae, and Pyralidae.

China Clipper inspected.--With the return to San Francisco of the Pan American airplane China Clipper recently from its pioneering flight from Guam via Wake, Midway, and the Hawaiian Islands, inaugurating fast transportation between South Sea islands and our West Coast, a very potent channel for the introduction of serious plant pests from those regions and the Orient. This is evidenced by the fact that upon arrival at the Alameda, Calif., Airport October 24, an inspection of the plane revealed the presence in quarters of cuttings of Caladium and Strelitzia plants, the former being infested with the Pinnaspis minor (Mask.) scale and the latter with two other scale insects, Saissetia hemispherica (Targ.) and Chrysomphalus aonidum (L.).

DOMESTIC PLANT QUARANTINES

Progress in citrus eradication.--The entire citrus-growing area in the Galveston-Houston country, extending from Galveston, Tex., to the Louisiana line at Orange, covering six counties, will have been inspected intensively for citrus canker by the close of December. Relief crews are following closely and destroying worthless escaped and abandoned citrus trees, and nearly one million such trees in this area have been destroyed since early in August. An encouraging feature of the work is that over 98 percent of the properties on which the trees are grown are being cleared of Citrus trifoliata, including yard plantings and hedges, and an even larger percentage of all citrus trees are being removed. The exceptions are occasional trees left in yards for shade or fruit on request of the owners. These are easily accessible for future inspection, if necessary. There is no commercial citrus industry in this area and the removal of the trifoliatas from practically all properties will materially lessen the likelihood of the spread of any subsequent infections from property to property by means of birds, insects, and other agencies. In Louisiana five parishes, including the three in which canker was recently discovered, have been completely cleared of all trifoliata growth, numbering 385,000 trees. The abandoned plantings and escaped trees in this area have, in many cases, grown to a height of 20 feet or more, and have become so entangled with vines and other wild growth as to form a jungle inaccessible to inspection. C. trifoliata stock was planted in abundance some 20 years ago, when a citrus enterprise was launched in southern Louisiana and the Galveston-Houston area, to produce Satsuma oranges on rootstock of the cold-resistant trifoliata. Such

stock was originally imported from Japan and was the means of introducing citrus canker into this country. Freezing weather in later years killed the Satsumas but the trifoliata rootstock proved so hardy as not only to resist the cold but also to "turn native", and reproductions have occurred miles from points of original planting. In the lower Rio Grande Valley exist many old nurseries of sour orange stock, long since abandoned. Such growth, if allowed to persist, could easily harbor disease for years without being detected, consequently relief labor is being used to destroy this stock. More than $1\frac{1}{2}$ million citrus trees from 564 properties have been destroyed. The project in the two States has provided 183,797 man-hours of employment for relief workers.

Transit inspection force strengthened for Christmas shipping.---Through the cooperation of other divisions of the Bureau, 12 additional inspectors have been assigned to assist in the inspection of winter shipments for compliance with Federal domestic plant quarantines, with special attention to the movement of Christmas trees and Christmas greens from the gypsy moth areas of New England.

More quarantines are violated in fall shipping.---Transit inspection at railway points shows no material increase in the number of shipments that constitute infringements of Federal quarantine regulations. It is noted, however, that an increased number of the quarantines were involved in the uncertified shipments intercepted. Violations of quarantines relating to the *Thurberia* weevil, the pink bollworm of cotton, the Mexican fruit worm, the black stem rust, the white pine blister rust, the gypsy moth, and the Japanese beetle have been intercepted by transit inspectors this fall. One hundred and six violations were reported in November.

Progress in phony peach disease eradication.---More than 4 million worthless peach trees had been eradicated to the close of November by relief workers on the phony peach disease project, according to William F. Turner, Bureau field leader, in a summary of the season's work. The project has been extended to Illinois and Missouri, and includes eradication in over one hundred counties in Georgia, Alabama, Arkansas, Mississippi, Louisiana, North Carolina, South Carolina, Tennessee, and Texas. The man-hours for the season have totaled 707,420, and the work will be continued during the remainder of the winter.

CONTROL INVESTIGATIONS

Beans fumigated in freight cars with HCN.---A series of tests on bean fumigation with HCN has recently been completed at North Kansas City, Mo., by A. C. Johnson. Carload lots of sacked beans were fumigated in freight cars with dosages of 10, 12, and 14 pounds of HCN per car, using 40-foot cars. The fumigation period was 24 hours. The temperature of the material ranged from 39° to 45° F. Bruchus obtectus Say, B. pisorum L., and Callosobruchus maculatus Fab. were used. Some 300 samples of this fumigated material are now under observation at Beltsville, Md. The results of the tests to date show that it is useless to attempt this type of fumigation for beans under low-temperature conditions. The tests also show the importance of the type of car used for fumigating as well as of wind velocity. Specimens of B. obtectus have survived all fumigations.

Cigarette beetles in tobacco can be killed in commercial cold storage.--Studies made by M. C. Swingle, Beltsville, Md., on the effect of low temperature on the cigarette beetle have shown considerable variation in resistance among the larvae. Freezing-point determinations were made by means of a thermocouple, and considerable variation was found in the actual crystallization point of different individuals. Full-grown larvae, pupae, and adults froze at about 17° F. Studies were also made on the rate of cooling of bales of cigar tobacco and hogsheads in a Richmond, Va., storage plant. From daily thermocouple readings, it was found that the center of bales of cigar tobacco cooled from about 62° to 12° in approximately 7 days. A standard hogshead of tobacco required 21 days for the same decrease in temperature. From these investigations, which are being made in cooperation with W. D. Reed, in charge of the Bureau's work on tobacco insects, it is intended to determine the feasibility of eliminating infestations of the cigarette beetle in certain tobaccos by placing them in commercial cold storage.

Ovicidal action of nicotine and other contact insecticides.--Studies on the ovicidal action of various compounds are being made by H. H. Richardson, Beltsville. House fly eggs are now being used, as these can be obtained in large numbers and have a short incubation period. The eggs are dipped in various mixtures, filtered off, and incubated in Petri dishes. Free nicotine, nicotine sulphate, and a number of other water-soluble nicotine compounds, have so far shown little toxicity to house fly eggs, even at high concentrations. Highly refined petroleum-white oil emulsions have also shown little toxicity, even where high concentrations of nicotine are added. The pyrethrins are somewhat more effective than nicotine, although not very toxic. Water suspensions of derris extracts have, however, shown a very decided ovicidal action on these eggs.

Quantitative study of toxicity of nicotine.--N. E. McIndoo, Beltsville, is continuing the use of a micrometer syringe to inject insecticides into insects. Dosages of 0.00124 cc of nicotine solutions, ranging from 1/32 to 3 percent (0.0004 mg of 100 percent nicotine), were injected into blowflies with an error not to exceed 4 percent. Independent of body weight, adults and larvae differ in susceptibility to nicotine. Flies 16 days old are six times as susceptible as flies 5 days old. A dosage as small as 0.0004 mg of nicotine completely paralyzes flies, stimulating at first, then depressing. It was found that nicotine is more toxic than nicotine sulphate, both having the same nicotine content. This injecting method has proved to be a quick and extremely accurate way of quantitatively determining the toxicity of nicotine solutions, and it can probably be used to inject other soluble insecticides.

Method for counting house fly eggs.--A simple method is needed to control the number of house fly eggs to be added to a given volume of culture medium. W. M. Sullivan, Beltsville, following the procedure of H. H. Richardson, breaks up the egg masses by shaking them in water, and pours the suspension of eggs rapidly into a Buchner funnel under suction. The eggs are fairly uniformly distributed on the filter paper. By counting the number of eggs on small sample areas of the paper, the area of paper bearing

the desired number of eggs can be determined, cut out, and dropped upon the medium.

Effect of pure arsenates of calcium on bean foliage.--In the News Letter dated August 1 (vol. 2, No. 8, p. 23), it was stated by J. W. Bulger that the toxicity to the silkworm of certain pure arsenates of calcium depended on whether or not they contained water of crystallization, the hydrated forms being more toxic than the corresponding anhydrous forms. The same relative toxicity to bean foliage was recently found by Mr. Bulger in preliminary tests in the greenhouse at Beltsville.

BEE CULTURE

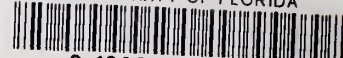
Annual meeting of Southern Beekeepers Federation.--The Southern Beekeepers Federation held a large and enthusiastic meeting at Nashville, Tenn., on December 2 and 3. Topics of special interest to queen breeders and package-bee producers were listed on the program. The Governor of the State spoke at one of the sessions. The next meeting will be held at San Antonio, Tex. The Division of Bee Culture was represented by Jas. I. Hambleton, Washington, D. C., C. L. Farrar, of the Laramie, Wyo., laboratory, and Warren Whitcomb, from the Baton Rouge, La., laboratory. After the meeting, Mr. Hambleton went to Baton Rouge to discuss the supersedure work with the personnel of that laboratory. Mr. Farrar also participated in this conference.

Tahiti requests removal of restrictions.--A request has been received from official sources in Tahiti that the present restriction on the importation of queen bees into the United States be removed insofar as it applies to Tahiti, on the ground that the mite causing the Isle of Wight disease is not present on the island; that no bees have been imported in recent years; and that an embargo will be placed on future importations. As it is reported that the only race of bees ever imported into Tahiti is the Italian, it is maintained that the present stock consists entirely of unhybridized Italian bees. E. L. Sechrist, formerly of this division but now living in Tahiti, is engaged in rearing queens there.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Lesser clover weevil recorded from Nevada.--Three specimens collected by C. W. McBeth at Reno, Nev., and recently submitted for identification, have been determined by L. L. Buchanan as Hypera nigrirostris Fab. Mr. Buchanan reports that the Museum collection contains a number of Pacific coast specimens sent in from Washington, Oregon, and California, but that these appear to be the first specimens received from Nevada.

A huckleberry-infesting tortricid in the Northwest.--Specimens of moths reared from larvae found infesting fruits of Vaccinium ovatum, the northwestern evergreen huckleberry, at Gig Harbor, Wash., have been identified by August Busck as Lotisna trigonana Walsingham. This interesting species has been received for identification from the Northwest a considerable number of times, but this appears to be the first record of a definite host-plant association.



Identity of certain plant-boring Noctuidae of the genus Apamea.--

Numerous specimens of moths belonging in the genus Apamea, the larvae of which are borers in plants, have recently been received for identification from various sources and have been determined by F. H. Benjamin as follows: (1) Apamea nictitans L. This is a European species recorded from the roots of grasses. As used by American authors the name is largely referable to Apamea americana Speyer, whose normal biology is unknown, but which occasionally attacks corn, and may be confused, in the larval stage, with other corn-boring larvae. The only known example of the true nictitans supposedly from a North American locality is a specimen received from the Brooklyn Museum and labeled "Prospect Park, Brooklyn, N. Y." (2) Apamea interoceanica Smith. This name has usually been incorrectly applied to Manitoba examples of the true americana and considered a variety of nictitans. It proves to be a valid species, however. Its larva is a borer in the crown of strawberry plants and as early as 1886 was noted by Pergande (manuscript notes) as doing much damage in Summit County, Ohio, although then identified as "? Mamestra" and subsequently as "Gortyna nictitans." This strawberry borer has a wide distribution, specimens having been identified from the following general localities; Manitoba and Alberta, Canada; New Hampshire; Massachusetts; New York; Pennsylvania; New Jersey; Virginia; and North Carolina. (3) Apamea keiferi Benj. Originally described from California, this species, which is closely related to the preceding, was recently identified for S. E. Crumb, of the Puyallup, Wash., laboratory, who reported it as a borer in iris at Tielton, Wash. Additional Washington specimens were submitted by A. R. Rolfs, and material from Utah has been identified for A. G. Richards. This species should not be confused with the well-known iris borer (Macronoctua onusta Grote).

A dipterous parasite of the black widow spider.--On several occasions recently a dipterous parasite of the black widow spider has been received for identification from southern California and has been determined by David G. Hall as Pseudogaurax signata Loew, a species of Chloropidae. This parasite has been known to develop in the egg sacs of several species of spiders, but seems not to have been previously recorded from the black widow spider.

First record of host association for an unusual serphoid genus.--In material received for identification from the Division of Truck Crop and Garden Insects were included three specimens reared by B. J. Landis at Columbus, Ohio, and recorded by him as tertiary parasites of Epilachna corrupta Muls. They have been identified by C. F. W. Muesebeck as a new species of Myrmecopria, a very unusual genus of Serphoidea belonging to the family Diapriidae. Up to this time the genus has been known only from the unique type of Myrmecopria mellea (Ashm.) collected in Florida.